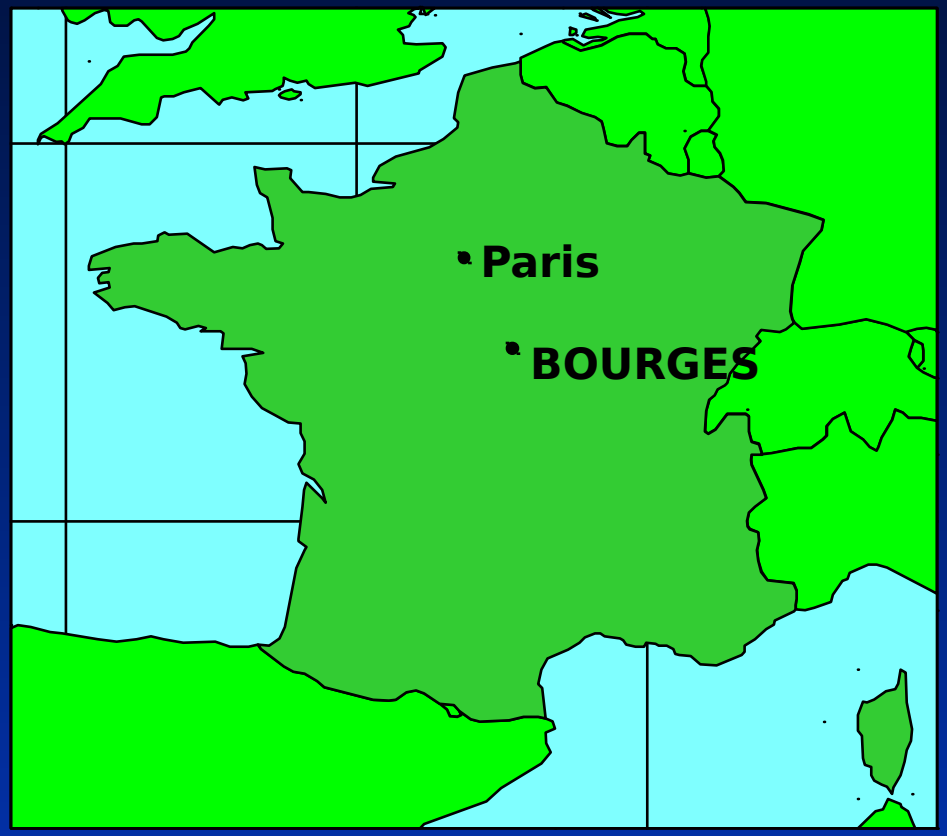
CTA International



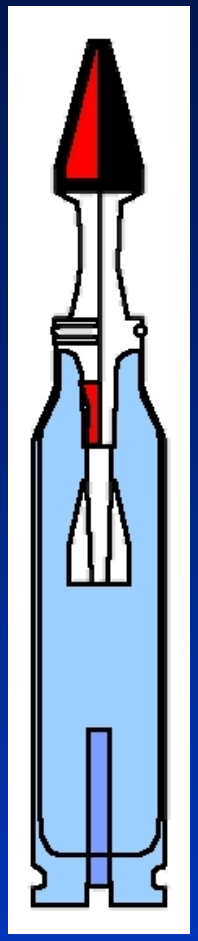
- CTAI is a joint venture company 50/50 BAE Systems and Giat Industries.
- Dedicated team, 40 strong, British and French engineers and scientists based in Bourges, France.
- Whole company focused on development of 40mm Cased Telescoped Weapon System.
- Technology Background funded from industrial investment.

Investment since 1994 - >€47M
Investment commitment - >€11.5M

CTA INTERNATIONAL

Cased Telescoped Technology

Principle of Technology
‘Telescoped’ ammunition



30% saving in volume for the same performance

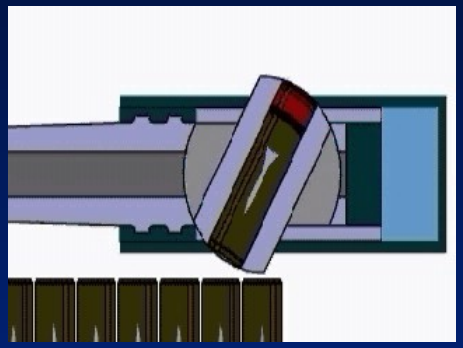
30% more performance for the same volume

CTA INTERNATIONAL

Cased Telescoped Technology

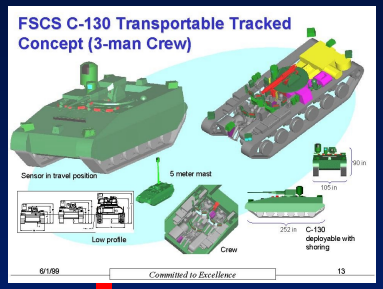
Cylindrical cartridges enable a much simpler Cannon mechanism
As a consequence the overall cannon system is substantially smaller

Rotating chamber and ‘push through’ concept



CTAI ‘Home Market’

FRES



Warrior

VBCI

EBRC

2008

2010

2010+

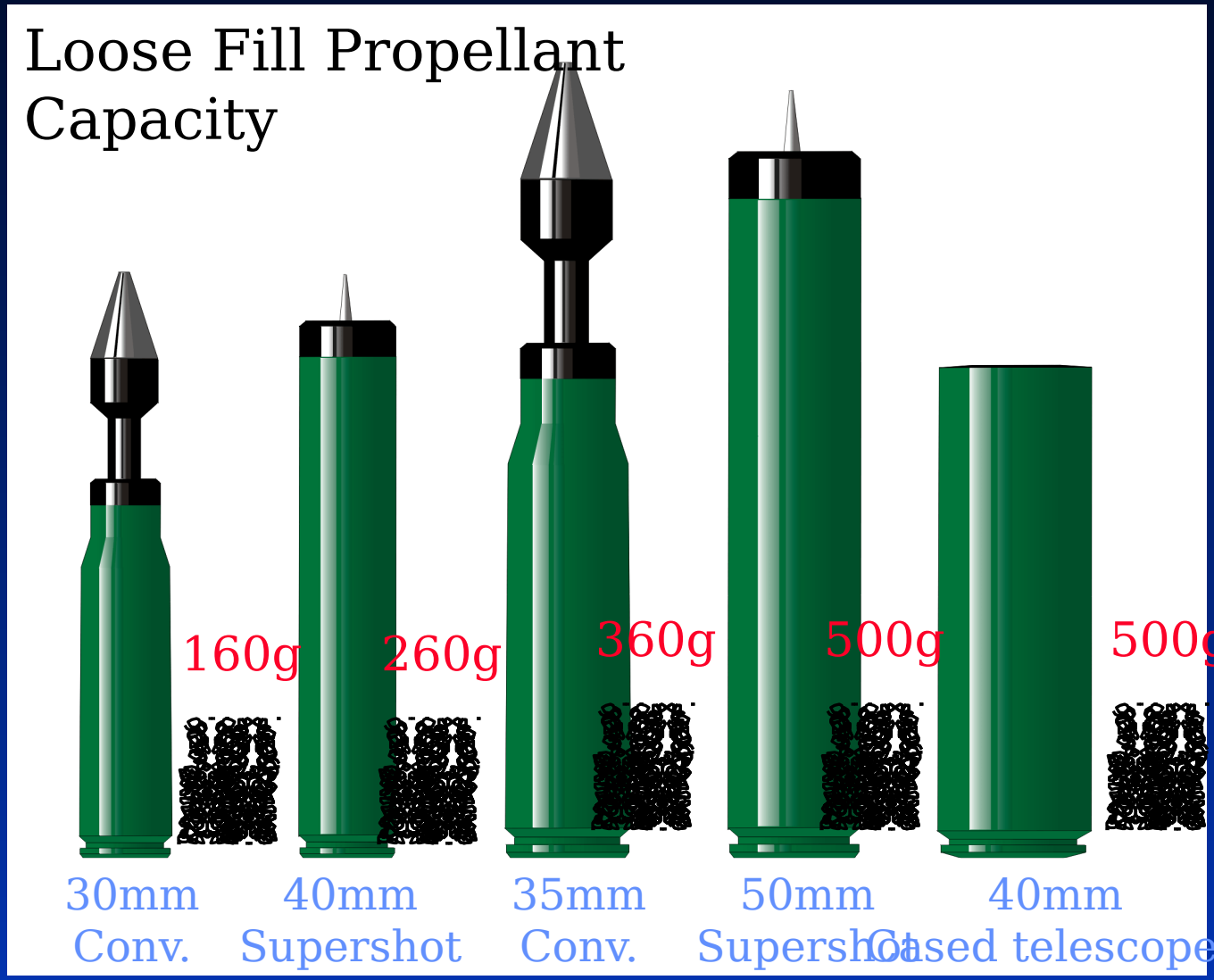
- **Total 1489 Systems**

CTA INTERNATIONAL

Why CTWS ?

Benefits CTWS

Performance Comparison Armour Def



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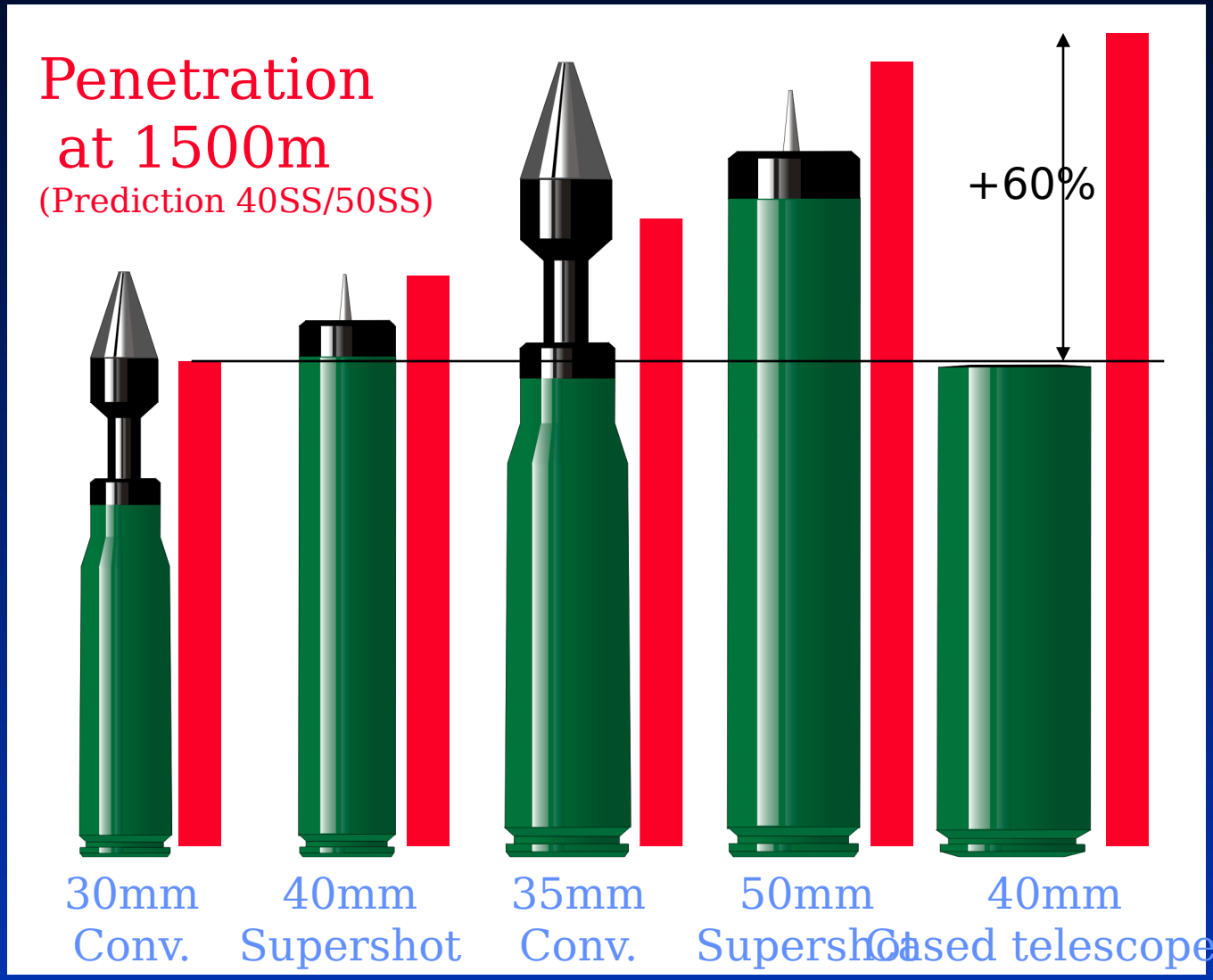
Performance Comparison Armour Def



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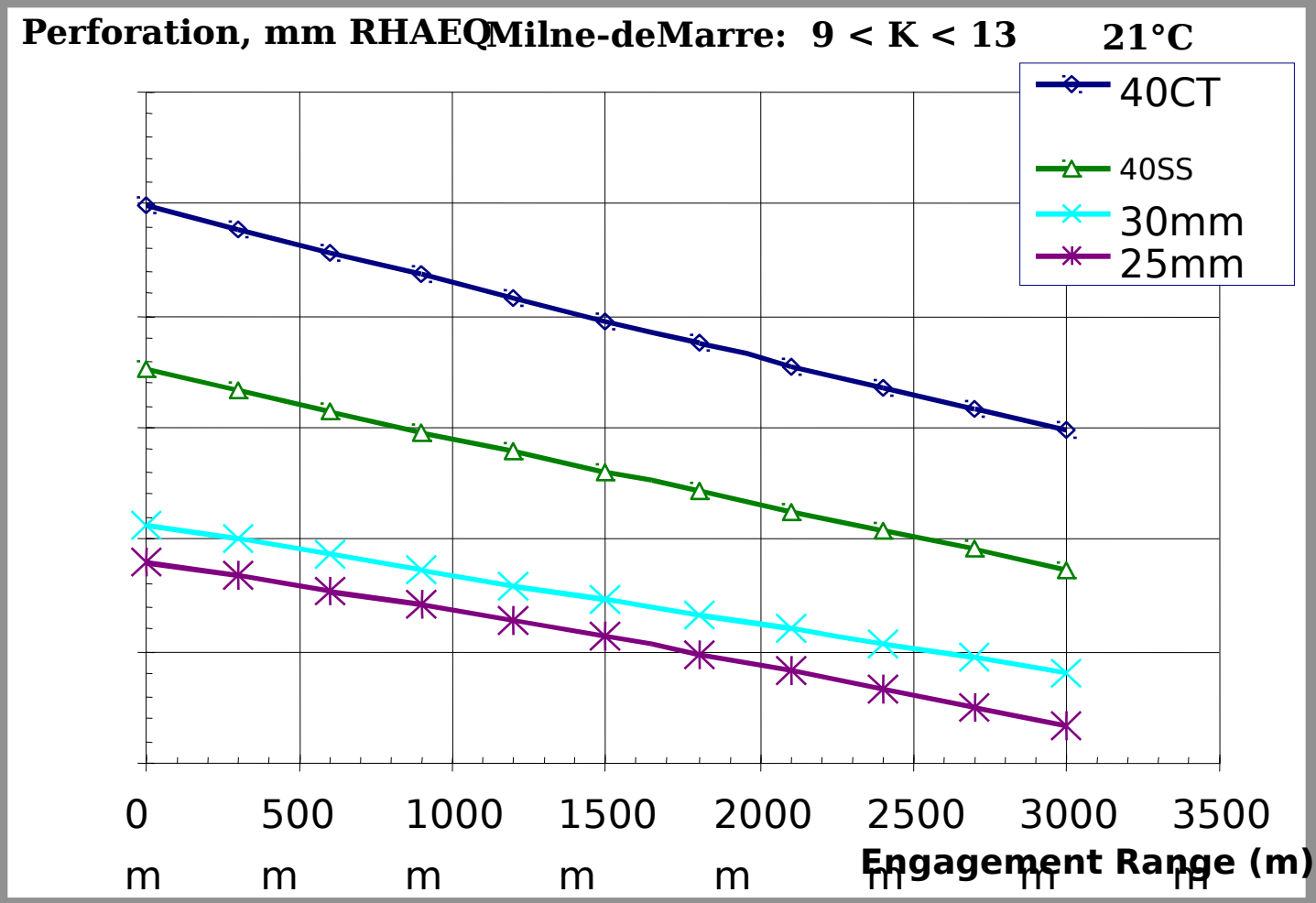
APFSDS Penetration

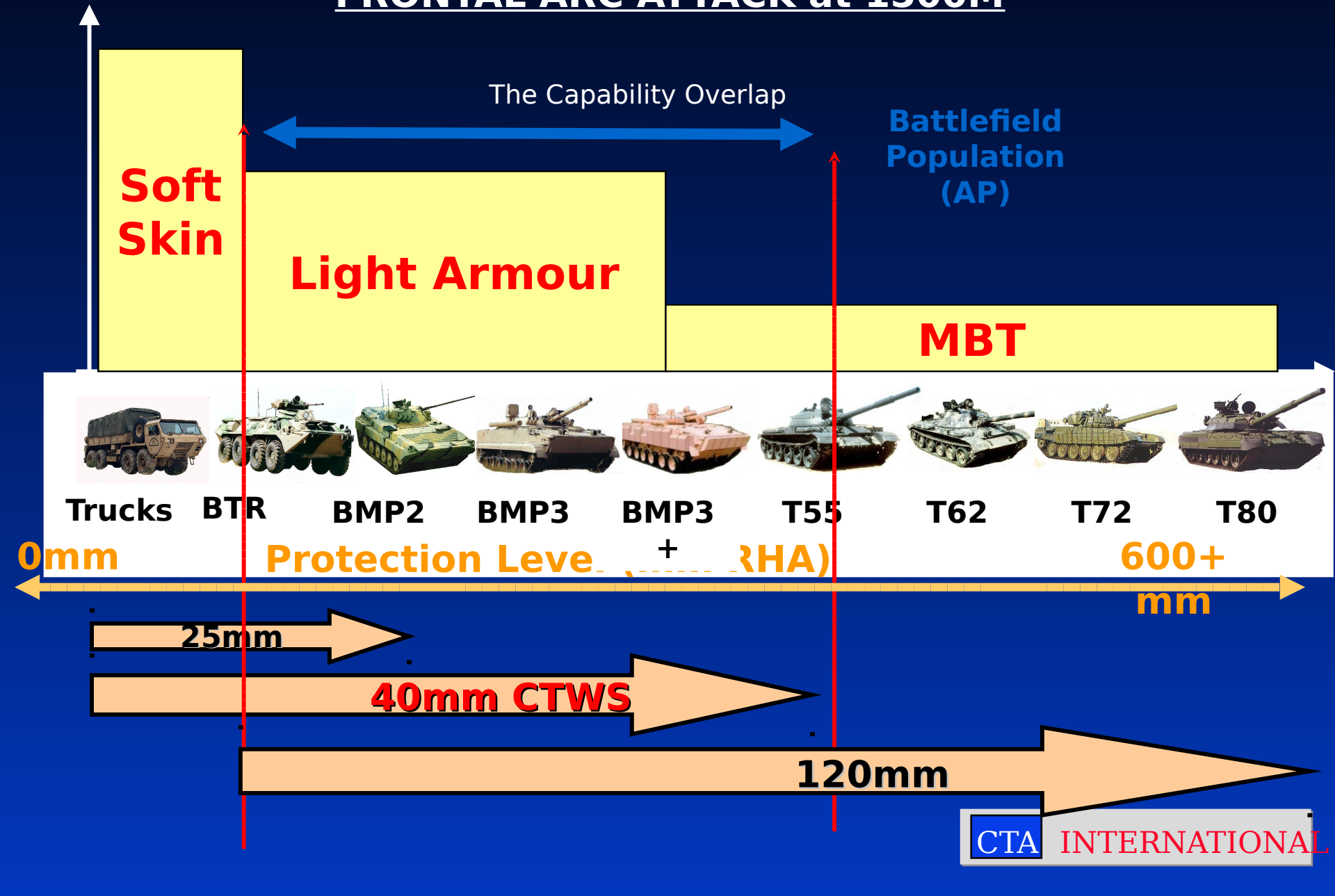
BMP3+

BMP3

BMP2+



Wide Threat Spectrum Capability
FRONTAL ARC ATTACK at 1500M



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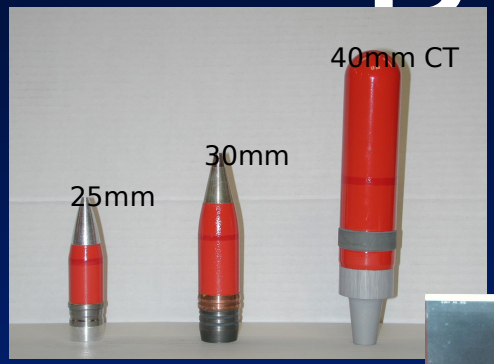
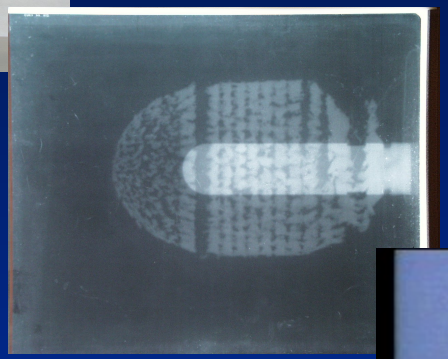
When It comes to HE.....

Bigger is Better



Large Payload



+ Fragmentation Technology

= Enhanced Lethal Effect

+ Airburst Fuze Technology

CTWS 40mm GPR

- Air burst capable
- Penetrate buildings, defensive positions
- Effective stowed kills
- IM Stanag 4439 compliance

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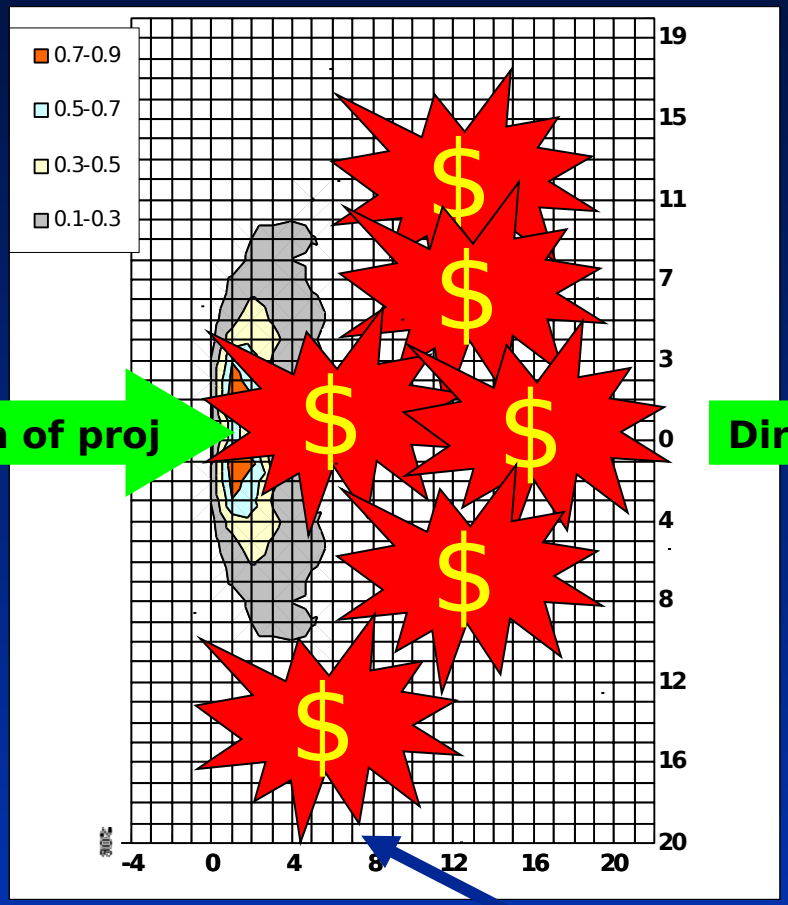
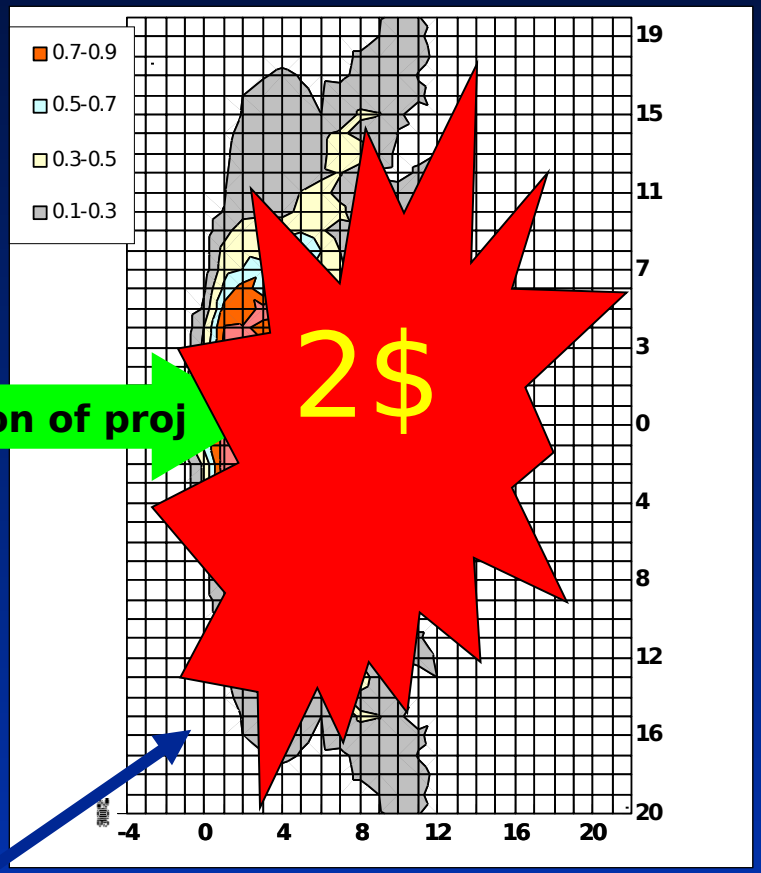
Comparison of Lethal Areas
(Single Round P.Incapacitation Crisat Prone)

30mm Airburst



Direction of proj

40mm CTWS Airburst



Direction of proj

Cost per Kill!

I Metre Squares

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40mm CTWS
Technology Readiness Level
TRL

CTA INTERNATIONAL

Government/Industry Partnership

- Since 2002 UK and French Governments have been investing **co operatively** in CTWS
- The **O**bjective **F**uture **C**annon **P**rogramme – OFCP
- Driven by the Requirements of:
  - UK Warrior, FRES
  - DGA VBCI, EBRC
- Customers are committed to share deliverables with other nations

France and the UK sign deal for 40mm CTWS

The French and UK governments have signed an agreement with CTA International (CTAI) to fund a risk-reduction programme for the 40mm Case Telescoped Weapon System (CTWS).

The objective is to ensure that the design is technically secure when the two armies need to select the armament for new platforms or mid-life update programmes.

According to David Leslie, CTAI managing director: "This demonstration of support from both governments is a major milestone in CTAI's programme. The joint contracts will enable us to work closely with the procurement agencies and user groups from both countries in an environment of shared information."

The British Army is expected to select the 40mm CTWS for the projected Warrior infantry fighting vehicle (IFV) upgrade and for at least one member of the projected Future Rapid Effects System, for which the user requirements document has recently been issued.

The French Army is expected to specify the weapon for the projected Engin Blindé à Roues de Contact, which is currently at the study phase. Versions of this could include a 6 x 6 model with a 40mm CTWS installed in a remote-controlled turret (*Jane's Defence Weekly* 10 April).

The CTAI work will include not only the weapon but also the ammunition-handling system and the two warshot natures of ammunition: armour-piercing fin-stabilised discarding sabot and a general-purpose round of the air-bursting munition type.

Under the terms of the contract, CTAI, working with France and the UK, will bring all elements of the system to a Technical Readiness Level (TRL-7) by December 2004.

The UK Ministry of Defence has recently completed its Objective Future Cannon Programme to determine which medium-calibre weapon would be appropriate for new vehicle platforms as well as upgrades of existing platforms. According to CTAI, the findings of this study have been shared and agreed with the French government.

For trials and demonstration purposes the 40mm CTWS was recently installed in the turret of the Alvis Vehicles Warrior (*JDW* 9 March). It is also installed in both examples of the SIKA and Lancer testbeds developed to meet the now cancelled operational requirements of the UK and US armies.

Giat Industries of France and BAE Systems RO Defence of the UK jointly own CTAI , and the two companies have provided all development funding to date as a private venture.

Christopher F Foss
JDW Land Forces Editor, Paris

British Army Warrior IFV armed with a CTAI **40mm Case Telescoped Weapon System**
CTA International: 0096862

Trade Studies 1997 –2002

UK MoD – Tracer Medium Cal req't
Lancer Prime - Tracer/Scout req't
SIKA Prime – Tracer/Scout req't
Joint UK/US Program Office
French MoD Cannon studies
UK MoD Objective Cannon Program

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UK MoD OFCP Objectives

- Demonstrate **TRL 7** by **End 2004**
  - Weapon
  - Feed System
  - APFSDS
  - GPI
  - GPR with Impact Fuze

Warrio
Based

✓**Platform Understood**
✓**Realistic Environment**

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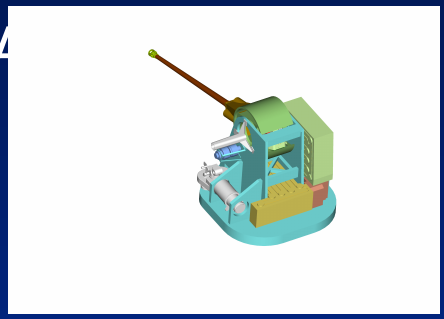
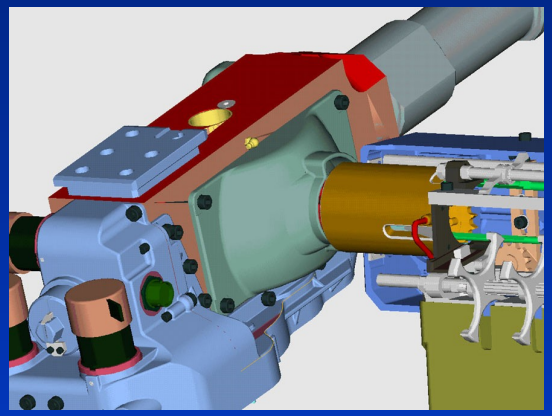
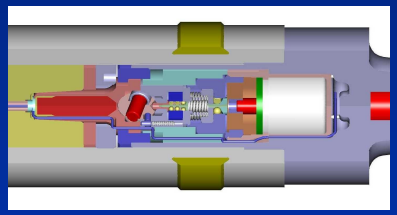
Future Lethality Solutions

- TRL 5
  - GPR Airburst Fuze (UK MoD)
  - Triple Feedsystem (DGA)
  - 80° Elevation range on weapon (DGA
  - Turret Integration (UK MoD/DGA
- TRL 4
  - Weapon Navalisation (UK MoD)
  - CTGP Advancement (DGA)

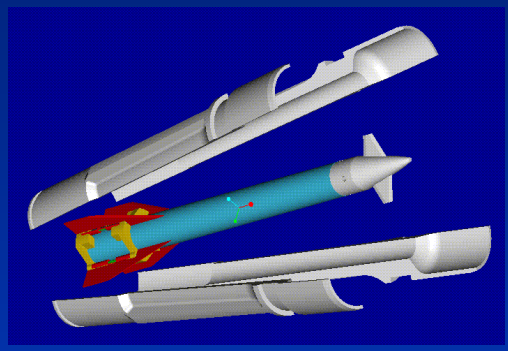
CTWS for T45







Airbursting Fuze Junghans/Diehl



CTGP

CTA INTERNATIONAL

Safety Qualification

Safety Testing of System; UK/US/Fr agreed Standard

UK MoD
Ordnance
Board

US DoD
DTC, ATC

CTA INTERNATIONAL

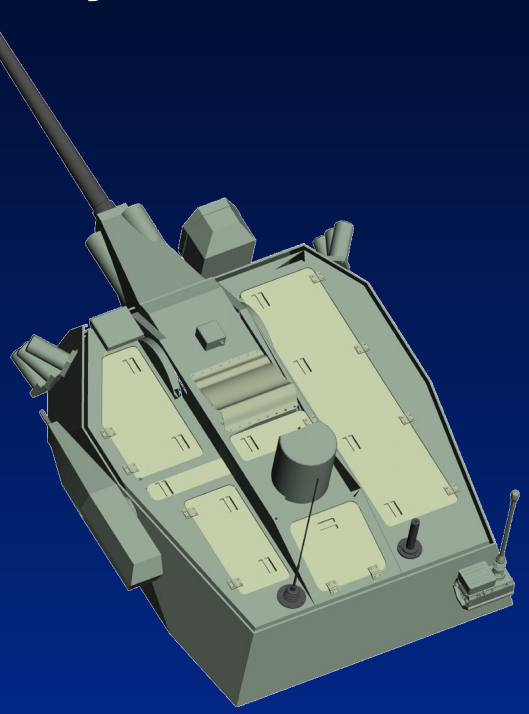
System Safety Qualification Status

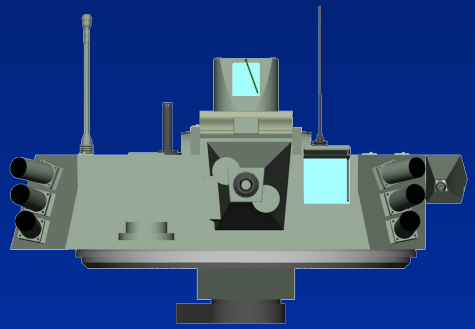
- Weapon Safety
  - Function in extreme environments Complete 2003
  - Fatigue testing of all safety critical components
- Weapon Sustainability
  - Reliability growth ongoing with UK MoD/French DGA.
  - New weapon is currently under full life assessment during 2004
- APFSDS Qualification
  - Complete Summer 2004
- Inert Practice Round Qualification
  - Complete Summer 2004
- GPR HE Point Detonating Qualification
  - Commences Fall 2004
- IM Testing Stanag 4439
  - Completed APFSDS/GPI Type IV and V results achieved
  - GPR HE Commences Fall 2004

Dynamic Press; Breech Ring and Chamber fatigue tests

Exploiting 40mm CTWS

Medium Calibre Turret Systems





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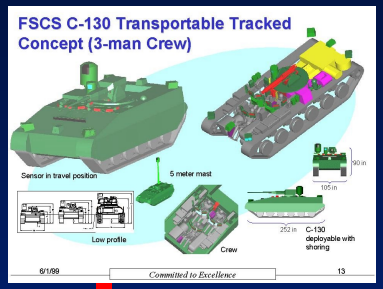
CTAI Home Market

FRES



Warrior

VBCI

EBRC

2008

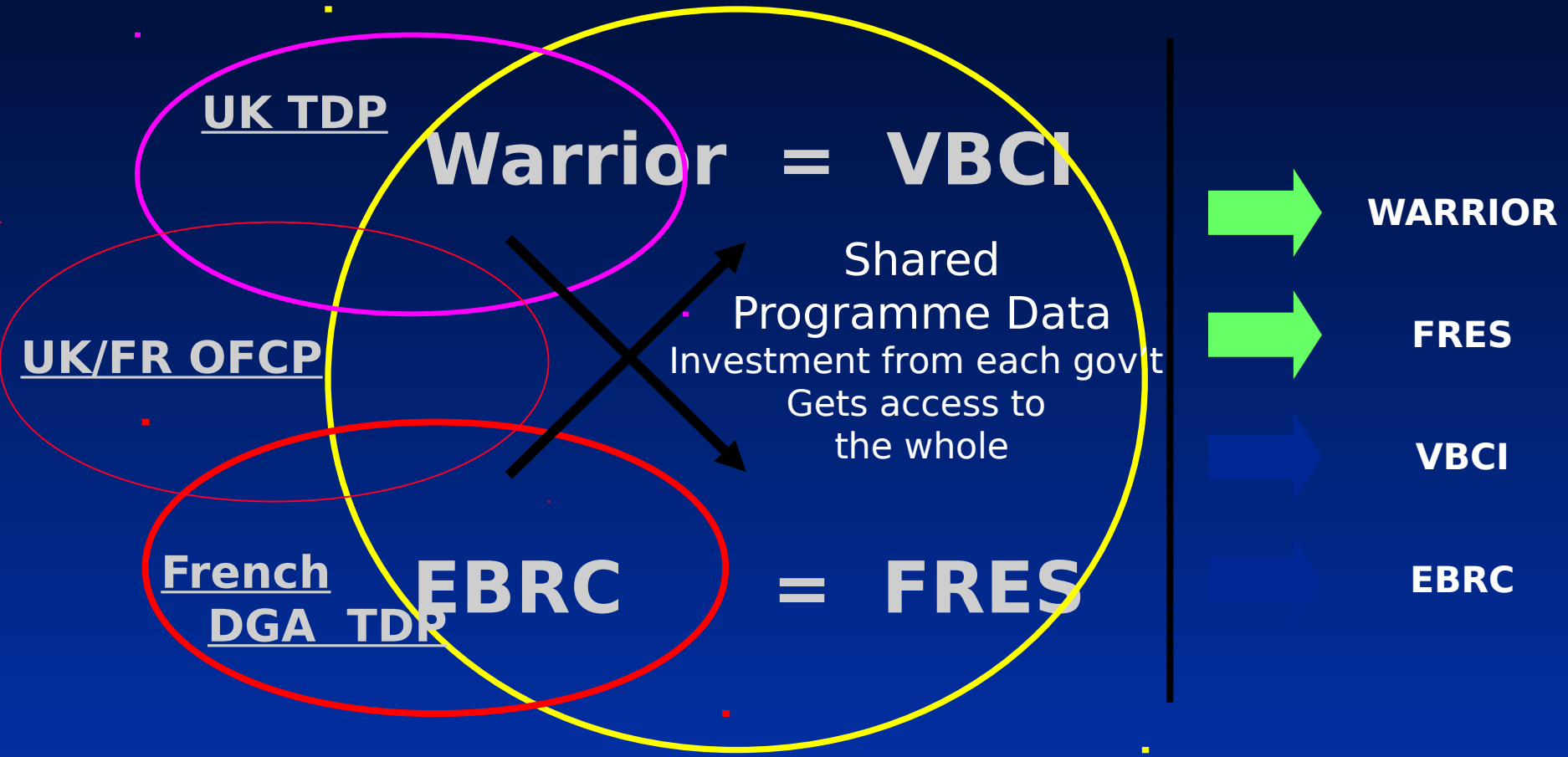
2010

2010+

- **Total 1489 Systems**

CTA INTERNATIONAL

UK and French Government Collaboration

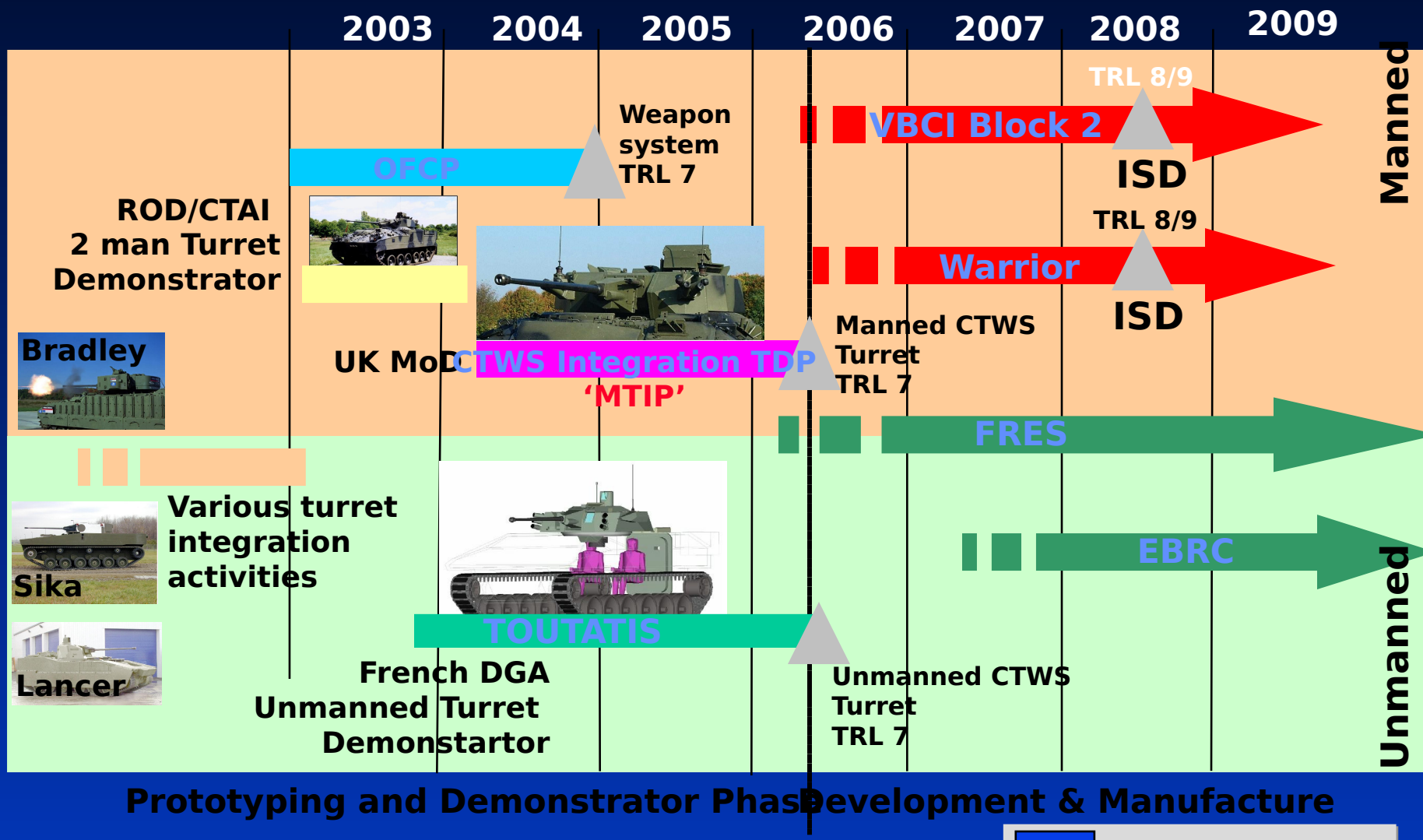


Prototyping and Demonstrator Phase

EMD & PROD'N

CTA INTERNATIONAL

Programme Links



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Two Man Turret System

40mm CTWS Warrior Application

Customer Drivers

CTA INTERNATIONAL

User Experience

Operation Telic has recently highlighted Capability Gaps of the existing Warrior Turret

CTA INTERNATIONAL

Problem

Reference URD 22/99(A); Para 9 1-7

- The wider operational scenario of Warrior today has highlighted deficiencies
  - Lethality
    - Unable to overmatch threat armour with existing 30mm Medium Calibre system
    - Unable to suppress enemy dismounted infantry
  - Fightability
    - Unable to engage targets while on the move
    - Commanders role compromised (‘reloading’)
    - Warrior cannot perform sustained support mission for its own section when dismounted
  - Survivability
    - Overmatched by numerous chemical and kinetic energy munitions

Concept: Low Risk and Low Cost

40mm CTWS is the Diffentiator

Exploit the investment already being made

‘Off the shelf’ 30mm turret

30mm Rarden

BOWMAN

BGTI

Capability: Lethality

Committed by UK MoD

A lot less

Cost lots

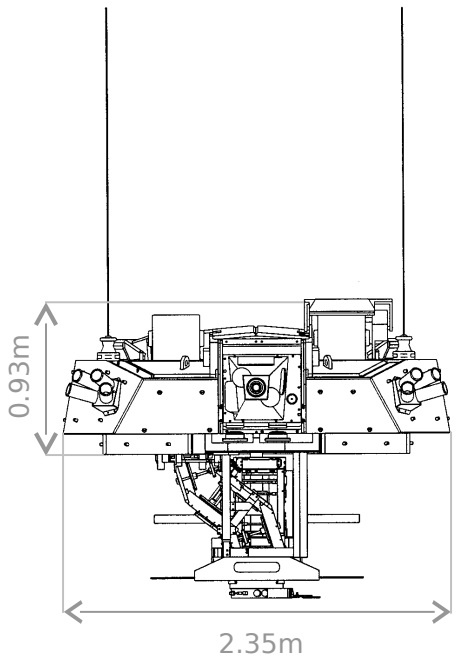
Cost

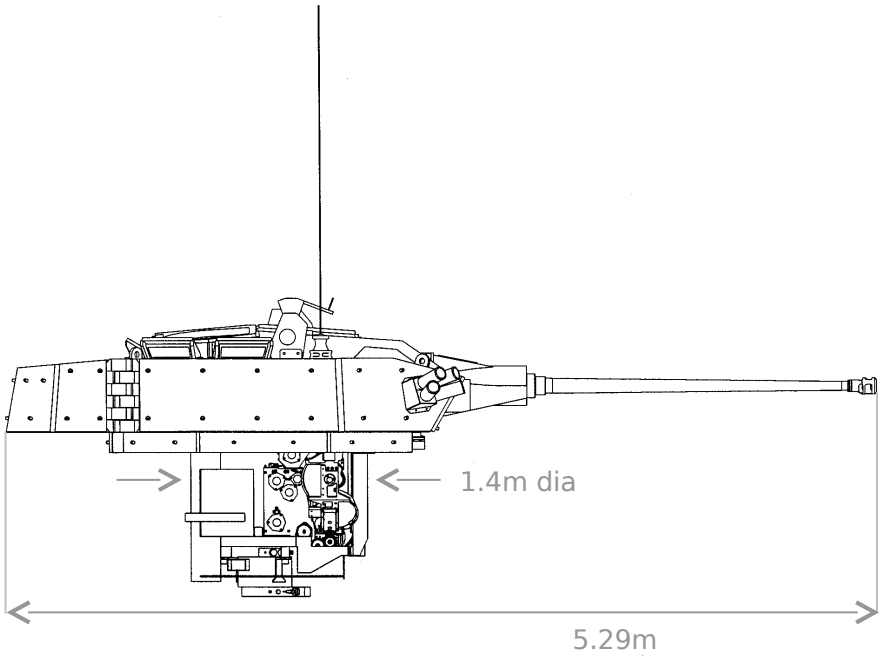
CTA INTERNATIONAL

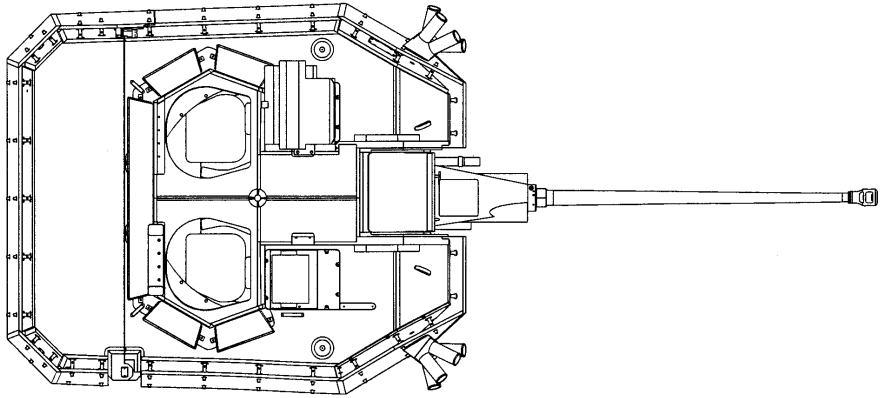
System Design and Programme Constraints

- Physical
  - Geometry; namely rail transportation
  - Weight
- Minimise System Cost
  - Use BGTI; Gunner sight and commander crew station
  - Accomodate Bowman
  - Maximise retained legacy turret equipment
  - ‘Off the shelf’ gun control equipment
- Minimise programme transaction and coordination costs
  - Interface with existing vehicle without modification
    - Mechanical (vehicle fit)
    - Electrical (power)

WARRIOR Turret System - Physical Characteristics







Mass: **3923 kg**

Inertia: **3423 kg.m²**

Traverse OOB (max theoretical): 509 N.m

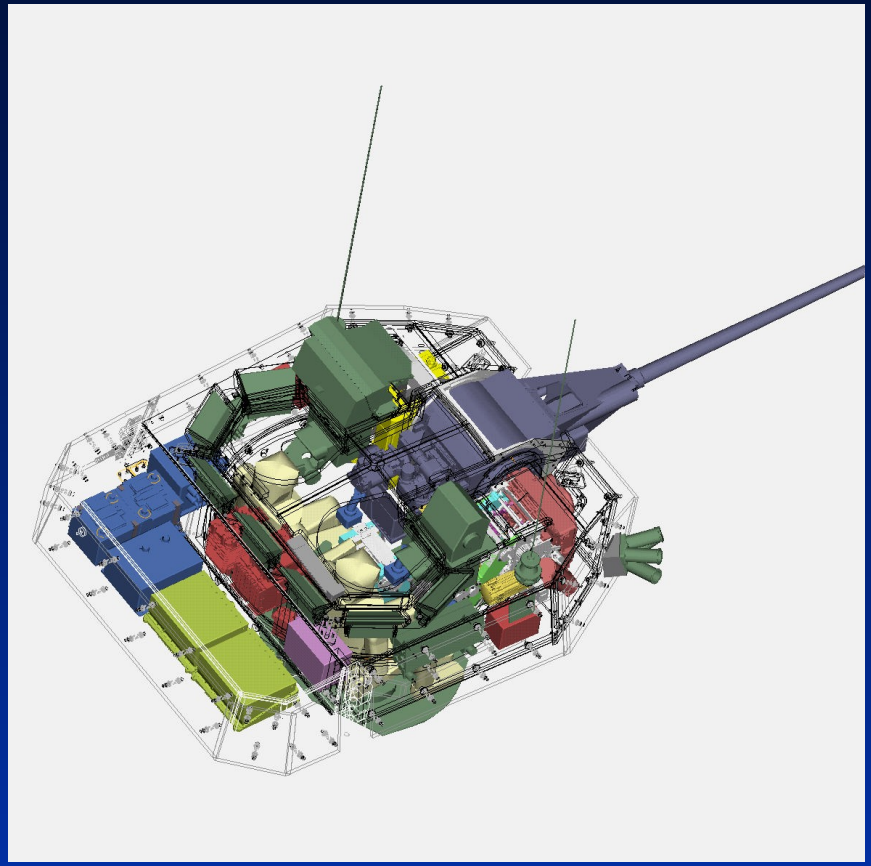
Elevation OOB **1200Nm**

IONAL

Technical Characteristics
40mm CTWS Warrior Turret

- Two Man Crew
- UK MoD BGTI Sighting system
- UK MoD Bowman

  ….‘Network Enabled’ BMS
- Fully Dual Axis Stabilised 40mm CTWS Weapon system
- 42 rounds 2 natures fully automatic amunition feed
- 7.62 Chain Gun Coax Weapon



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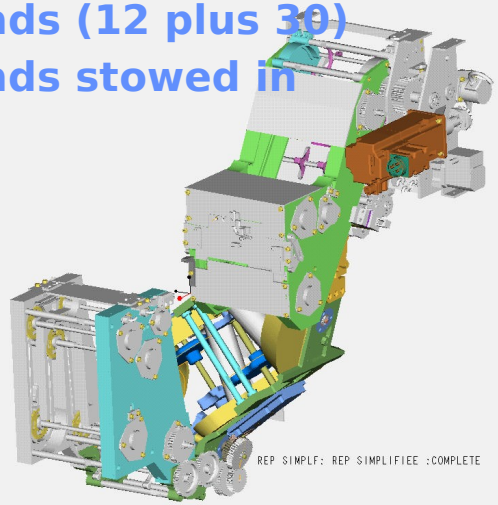
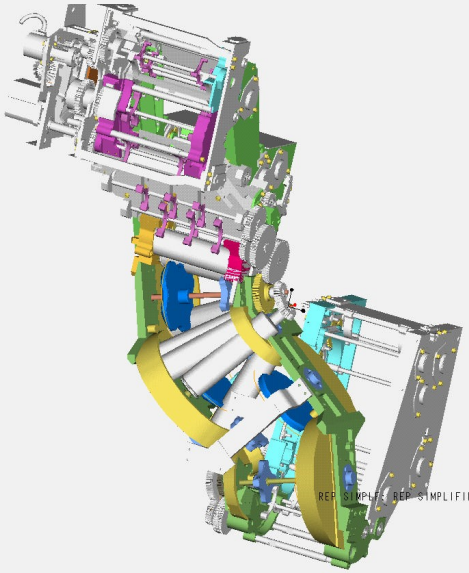
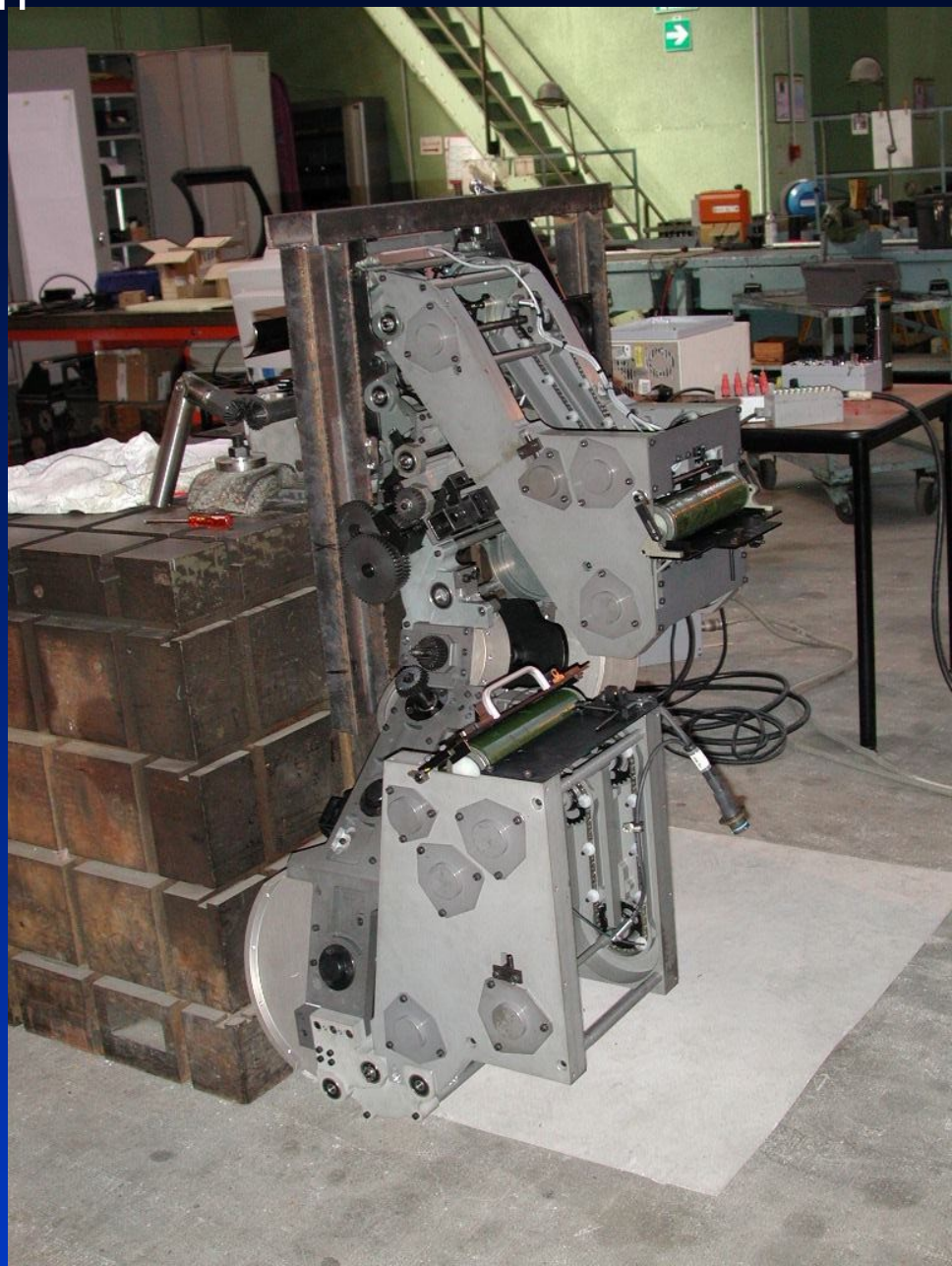
Feed System

- **42 rounds (12 plus 30)**
- **78 rounds stowed in racks**







Interface with Chassis

Operational Effectiveness

✓Improved Protection

✓Sustained Fire Support Single man operation

✓Reduced Commander Work load

✓Fire ‘On the Move’

✓Suppression Lethality

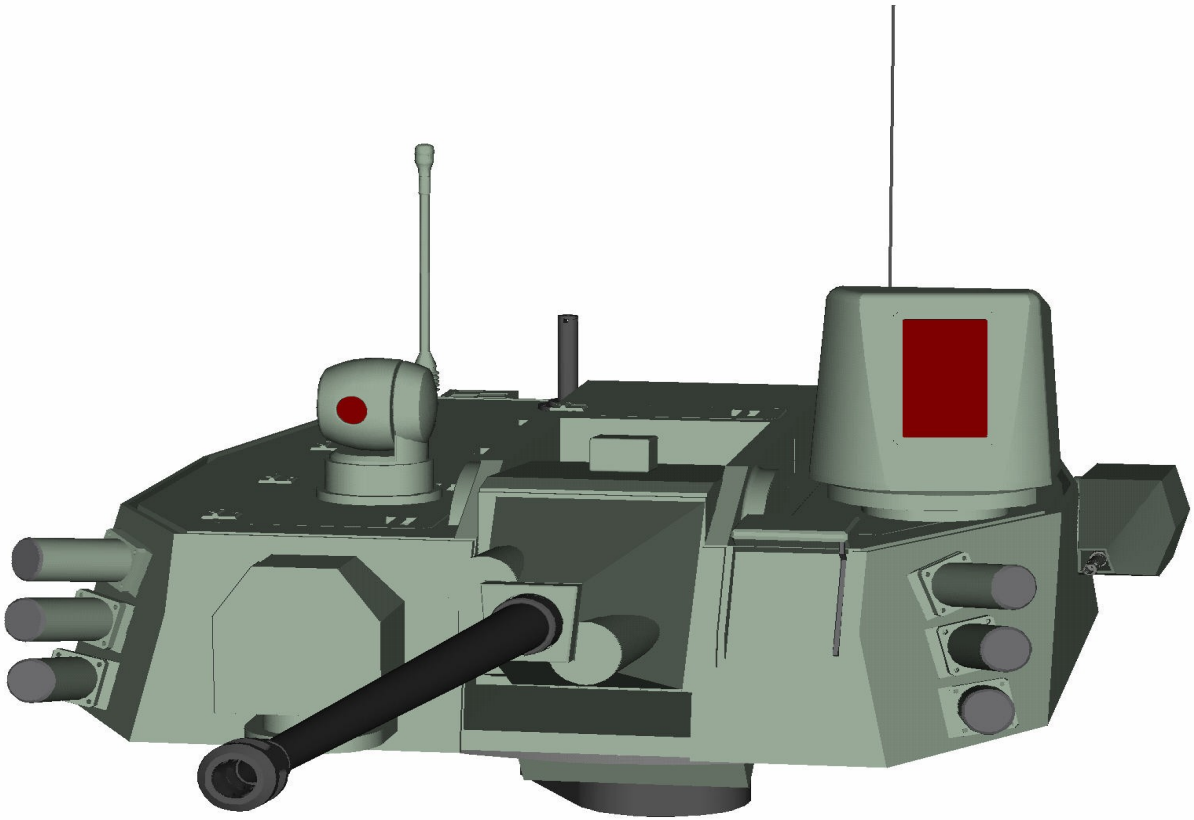
✓Anti Armour Lethality

CTA INTERNATIONAL

MTIP Programme Aims

- Demonstrate **S**ystem integration **R**eadiness **L**evel (SRL) 6 by Summer 2006.
- To demonstrate and evaluate with the user (UK MoD **I**nfantry **T**rials and **D**evelopment **U**nit (ITDU)) a fully integrated 40mm CTWS turret.
- This programme produces risk reduction data for FRES and positions the solution for Warrior Lethality Upgrade.

French TDP; DGA Remote Turret Demonstrator

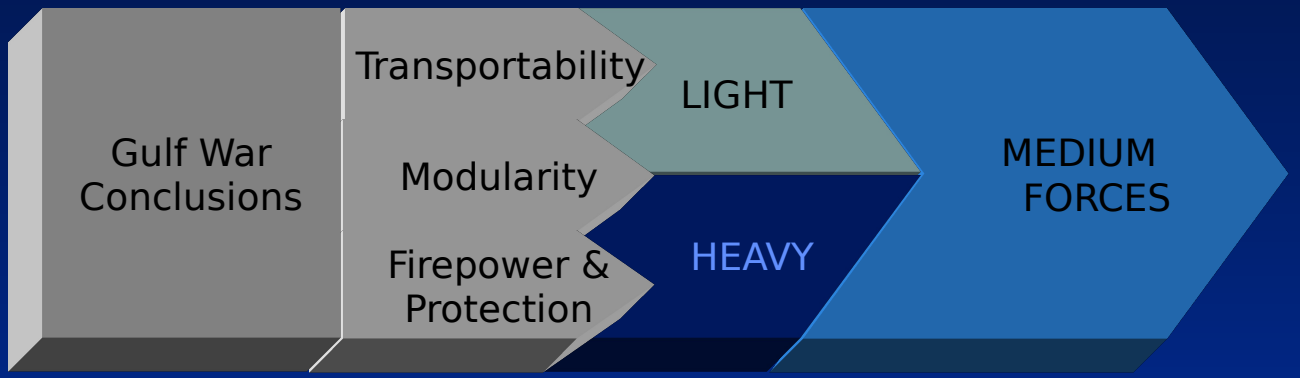


Contract No. 03.55.462
« *Study & Evaluation of a Demonstrator of a mounted and remotely operated 40 CTA Weapon System* »

Context : EBRC Requirement

« … the question is how to balance these opposing requirements and come up with something which, a) gives rapid deployment and, b) gives you the weight of military effect which you seek. »

General Sir Mike Jackson commenting on Operation Telic

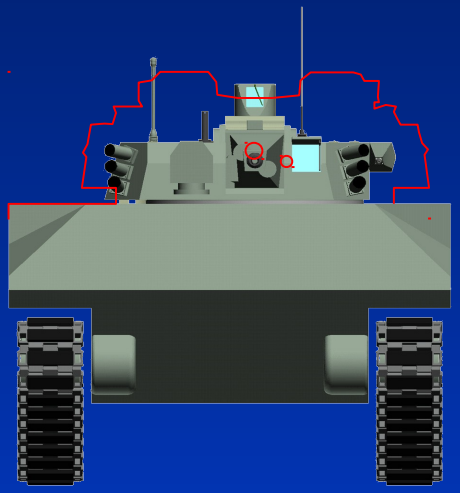


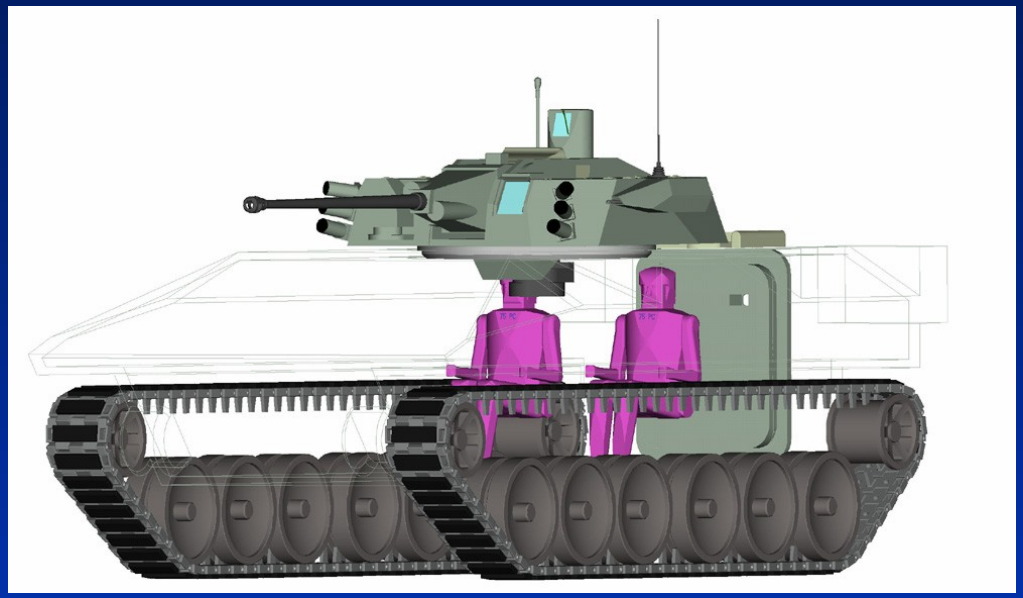
- Light but powerful (<20T)
- Replace AMX 10RC Recce variant (2012+)
- Support LECLERC MBT operation

However, weight – firepower/protection trade-off remains a challenge…

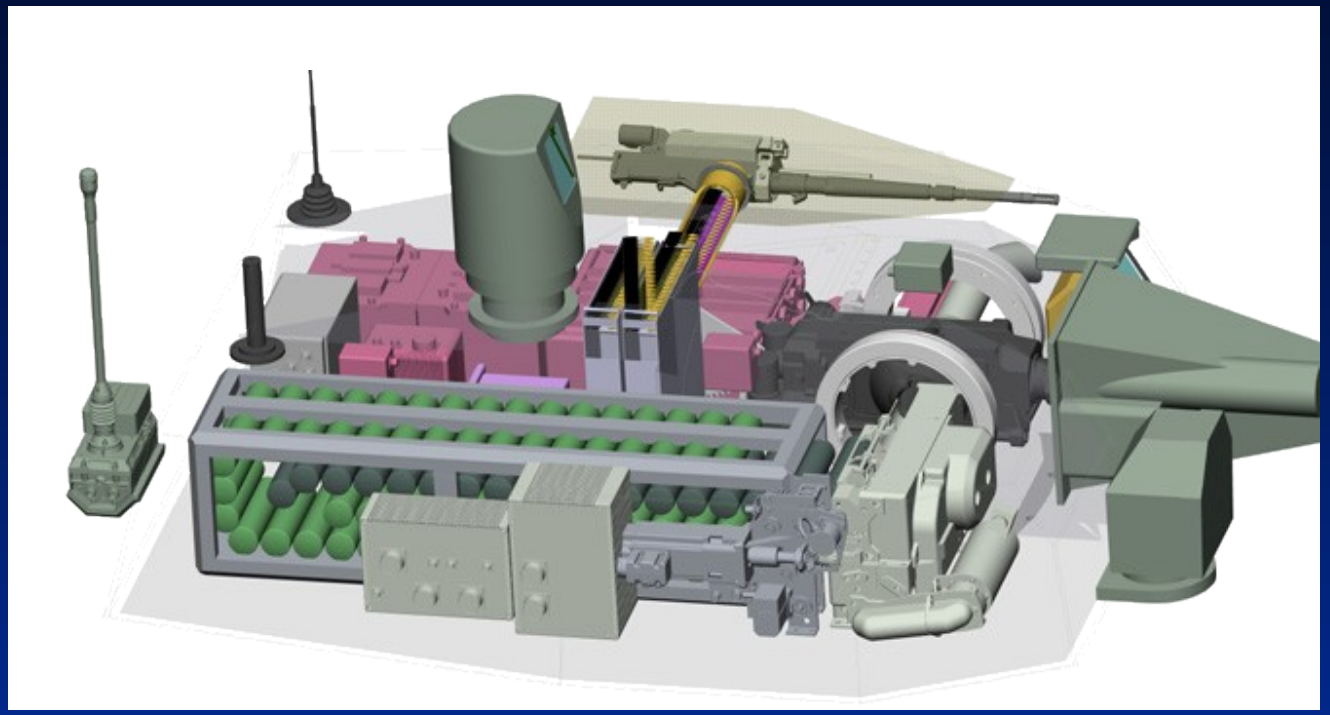
Unmanned turret benefits

- SURVIVABILITY – Unmanned Turret
  - Crew located within chassis
    - maximum protection
    - counters 3D urban threat
  - Low profile - reduced detection
  - Improved NBC protection
  - Turret armour
    - 14.5mm MG
    - (+ appliqué)





Primary Weapon Integration



40mm CTWS

78 round
magazine

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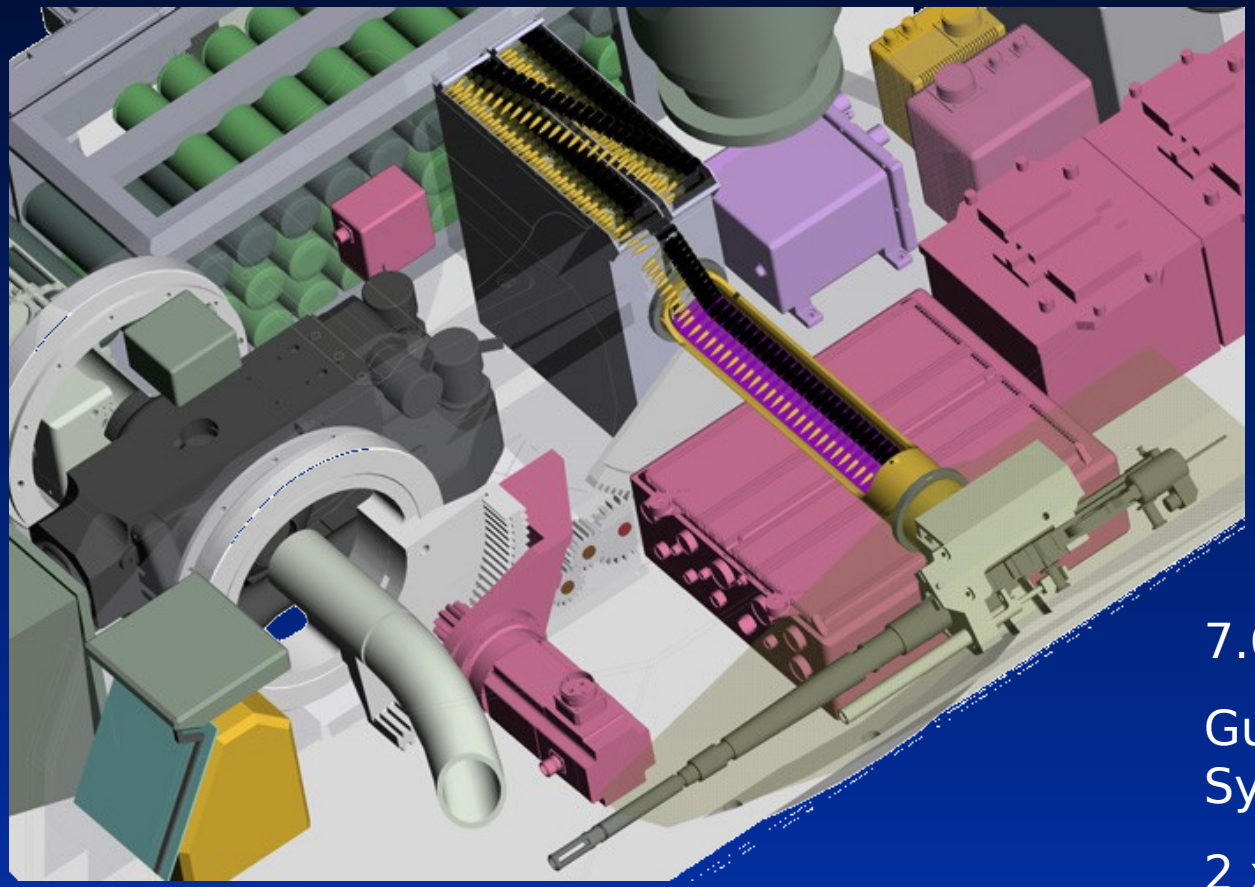
Primary and Secondary Weapon System



7.62 AN F1

Gun Control System

2 x ammuntion boxes

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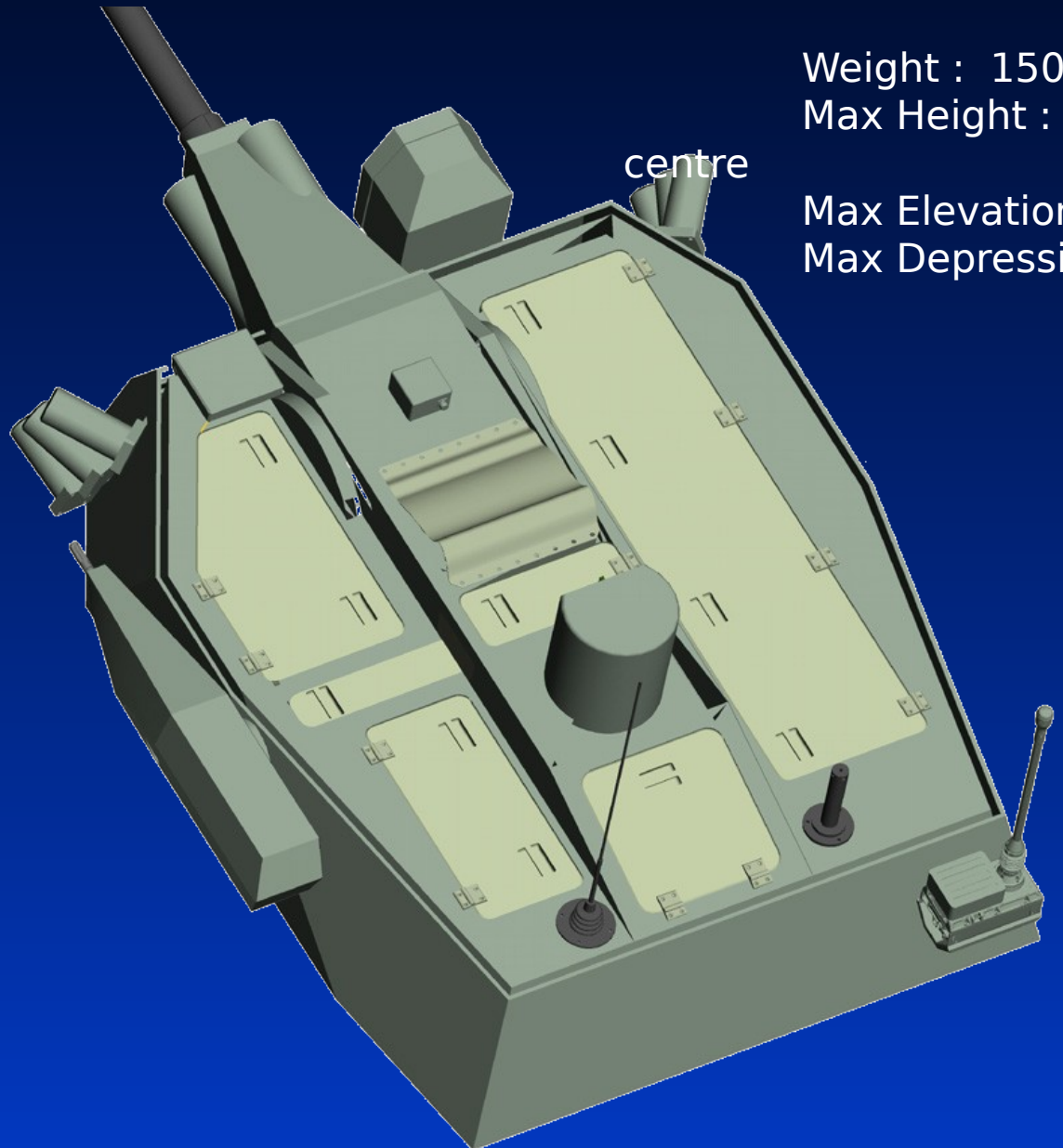
Turret Architecture Objective System Characteristics



Weight : 1500 KG
Max Height : 430 mm Flanks; 510mm in

Max Elevation : +80°
Max Depression : -12°

- Minimal intrusion
- Minimised silhouette
- Modularity of sub systems with manned turret
- Maximise stealth

CTA INTERNATIONAL

In Summary

- **CTAI poised to support weapon requirements in New and Legacy Light Armored Vehicle Platforms at turret system level.**
- **Bold Industrial Investment has been the key to success**
- **2004 will see CTWS at TRL7 (ready for production)**
- **UK and French government commitment to, and investment in, CTWS positions it strongly in the wider export market place at turret system level (in particular Europe).**
- **By 2006 fully integrated 40mm CTWS turret systems will be available to support all major UK and French LAV platform**

And Remember…….

Whichever way you go in gun integration, you will probably have it For the next 30 Years!

CTA INTERNATIONAL